REMARKS

The Amendments

Claims 1 and 2 are amended to clarify the temperature of the heat treating step. This amendment does not narrow the scope of the claims and was not made for reasons related to patentability since it merely states what was clear from the disclosure as to the temperature of heat treating. This is the broadest temperature range disclosed in the specification; see, e.g., page 5, lines 2-3. The amendments should not be interpreted as an acquiescence to any objection or rejection made in this application. Further dependent claims have also been added. Support for these claims is found throughout the specification; for example, see page 6, lines 3-7 and 21-23; page 8, lines 3-5; and, page 8, lines 20-23.

To the extent that the amendments avoid the prior art or for other reasons related to patentability, competitors are warned that the amendments are not intended to and do not limit the scope of equivalents which may be asserted on subject matter outside the literal scope of any patented claims but not anticipated or rendered obvious by the prior art or otherwise unpatentable to applicants. Applicants reserve the right to file one or more continuing and/or divisional applications directed to any subject matter disclosed in the application which has been canceled by any of the above amendments.

The Rejection under 35 U.S.C. §101/112

The rejection of claim 5 under 35 U.S.C. §101 or §112§ is believed to be rendered moot by replacement of the "use" claim with article claims.

The First Rejection under 35 U.S.C. §103

The rejection of claims 1, 3 and 4 under 35 U.S.C. §103, as being obvious over Imaizumi (U.S. Patent No. 4,902,357) is respectfully traversed.

Imaizumi discloses a process for preparing a permanent magnet of an R-T-B alloy. In the process, the alloy is crushed, compressed in a magnetic field, sintered, machined to the appropriate shape, solution treated at 900-1200°C and then aged in a gas atmosphere at 300-900°C. See, e.g., col. 1, line 61, to col. 2, line 38. The reference teaches that the gas atmosphere for the ageing step is oxygen, nitrogen or their combination. It also teaches that the oxygen atmosphere is advantageous in that it provides a thin layer of black rust on the surfaces of the magnet which give it corrosion resistance; see, col. 2, lines 39-44. All of the examples in Imaizumi use an oxygen-containing atmosphere for the final heat treating step.

Imaizumi fails to disclose a process wherein the permanent magnet alloy is crushed in an "oxygen-free atmosphere or argon, nitrogen or vacuum." Compare applicants' claims 1 and 2. While Imaizumi discusses the alternatives of oxygen or nitrogen atmospheres for the later steps of ageing, there is no disclosure or suggestion to conduct the crushing step in an oxygen-free atmosphere. Since Imaizumi specifies the atmosphere in the later steps but not in the earlier crushing step, the only reasonable interpretation is that Imaizumi conducts the crushing step in an open atmosphere not excluding oxygen, i.e., in air.

Because Imaizumi does not teach or suggest conducting the crushing or comminuting step in an oxygen-free atmosphere, it is also evident that the product obtained after crushing, compacting, sintering would not have a low oxygen concentration of "up to 8.0% by weight." Compare applicants' claims 1 and 2 again.

Imaizumi also fails to recognize the distinction between and oxygen and nitrogen atmosphere in the final heat treating step. Although it generally includes the possibility of a solely nitrogen atmosphere in this step, it recognizes no advantage of nitrogen over oxygen and, in fact, shows a preference to an oxygen-containing atmosphere. All of Imaizumi's examples utilize an oxygen or partial oxygen atmosphere.

Applicants have discovered that the exclusion of oxygen as recited in the claims leads to advantageous magnets which, particularly, exhibit excellent corrosion resistance in the presence of lubricating oils – such as encountered when the magnets are used in motor applications. See, e.g., page 2, line 34, to page 3, line 8, of the instant specification. One embodiment of this advantage of applicants' invention is demonstrated in Example 1 and Comparative Examples 1 and 2 at pages 8-11 and Figures 1-2 of the disclosure. Particularly, Example 1 and Comparative Example 2 are conducted side-by-side wherein the heat treating in Example 1 is in an argon atmosphere and Comparative Example 2 in an air atmosphere. The results show advantageous magnetic properties for the magnet of Example 1 and (see Table 1) enhanced corrosion resistance over the Comparative Example 2 magnet, particularly in the presence of an ether oil lubricant, i.e., 1.2% corrosion compared to 8.9% corrosion.

Contrary to recognizing the need to exclude oxygen in the manner of applicants' invention, Imaizumi appears to indicate that oxygen to some extent is desirable for their purposes. Thus, Imaizumi notes approvingly the formation of a rust layer on its magnets' surface and the content of oxygen at the surface of its magnets in Example 6 and Figure 2. Thus, it is urged that Imaizumi, contrary to suggesting applicants' invention or the advantages thereof,

would direct one of ordinary skill in the art away from modifying their process to arrive at applicants' invention or recognize the advantages thereof.

For each of the above reasons, independently, applicants respectfully submit that Imaizumi fails to render the claimed invention obvious to one of ordinary skill in the art. Thus, the rejection under 35 U.S.C. §103 should be withdrawn.

<u>The Second Rejection under 35 U.S.C. §103</u>

The rejection of claim 2 under 35 U.S.C. §103, as being obvious over Takebuchi (U.S. Patent No. 5,595,608) in view of Imaizumi is respectfully traversed.

Takebuchi discloses a method for making an R-T-B permanent magnet which involves starting with two different alloys and mixing them. It is not clear whether the two alloys used in Takebuchi meet the recitations of the mother alloy and auxiliary alloy of the instant claims and applicants reserve the right to argue a distinction on this basis. But such arguments is not necessary at this time because the prior art is clearly distinguished for at least the reasons which follow.

The basis for the rejection is that Imaizumi would suggest to one of ordinary skill in the art carrying out the Takebuchi process with two alloys in a manner which excludes oxygen by the means recited in applicants' claim 2. The discussion of Imaizumi above (incorporated by reference herein) however, makes clear that that Imaizumi does not teach the manners of oxygen exclusion recited in the instant claims nor the advantages thereof. Takebuchi does not even disclose a final heat treating step and, thus, teaches nothing regarding oxygen exclusion in such step.

Accordingly, the combination of Takebuchi and Imaizumi cannot render the claimed invention obvious to one of ordinary skill in the art. Thus, this rejection under 35 U.S.C. §103 should also be withdrawn.

It is submitted that the claims are in condition for allowance. However, the Examiner is kindly invited to contact the undersigned to discuss any unresolved matters.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Specification

Table 1 has been amended at (page 10, lines 26 to the bottom), to read as follows:

Table 1: Deterioration* after tube test (150°C)

Commercial refrigerating machine oil	HFC Alternative	Deterioration* after tube test (150°C)				
		CE1		EX1		CE2
		500 hr	1000 hr	500 hr	1000 hr	500 hr
ester oil	R410A	12.0%	31.8%	1.1%	1.2%	1.60%
ether oil	R410A	31.9%	unmeasurable ~~(powered)~~ (powdered)	1.2%	1.5%	8.90%

* a percent deterioration at Pc = 0 of magnet property after the tube test from the initial magnet property.

In The Claims

Claims 1 and 2 have been amended to read as follows:

1. (Amended) A method for preparing a rare earth permanent magnet to be exposed to a refrigerant and/or lubricant for an extended period of time, comprising the steps of:

casting an alloy based on R, T and B, wherein R is neodymium or a combination of neodymium with one or more rare earth elements, T is iron or a mixture of iron and cobalt, and B is boron, said alloy consisting essentially of 17 to 33.5% by weight of neodymium, 26.8 to 33.5% by weight of the entire R, 0.78 to 1.25% by weight of B, 0.05 to 3.5% by weight of at least one element selected from the group consisting of Ni, Ga, Zr, Nb, Hf, Ta, Mn, Sn, Mo, Zn, Pb, Sb, Al, Si, V, Cr, Ti, Cu, Ca and Mg, the balance being T and incidental impurities,

crushing the alloy in an oxygen-free atmosphere of argon, nitrogen or vacuum, followed by comminution, compacting under a magnetic field, sintering and aging, thereby yielding a sintered magnet having an oxygen concentration of up to 0.8% by weight, and magnetic

properties including a residual flux density Br of 12.0 to 15.2 kG and a coercive force iHc of 9 to 35 kOe,

cutting and/or polishing the sintered magnet to give a finished surface, and

heat treating the sintered magnet in an argon, nitrogen or low-pressure vacuum atmosphere having an oxygen partial pressure of 10^{-6} to 10^{0} torr for 10 minutes to 10 hours <u>at a temperature of 200 to 1,100°C</u>.

2. **(Amended)** A method for preparing a rare earth permanent magnet to be exposed to a refrigerant and/or lubricant for an extended period of time, comprising the steps of:

furnishing a mother alloy based on R, T and B, wherein R is neodymium or a combination of neodymium with one or more rare earth elements, T is iron or a mixture of iron and cobalt, and B is boron, said mother alloy consisting essentially of 17 to 33.5% by weight of neodymium, 26.8 to 33.5% by weight of the entire R, 0.78 to 1.25% by weight of B, 0.05 to 3.5% by weight of at least one element selected from the group consisting of Ni, Ga, Zr, Nb, Hf, Ta, Mn, Sn, Mo, Zn, Pb, Sb, Al, Si, V, Cr, Ti, Cu, Ca and Mg, the balance being T and incidental impurities, and an auxiliary alloy consisting essentially of 28 to 70% by weight of R' wherein R' is at least one rare earth element, 0 to 1.5% by weight of B, 0.05 to 10% by weight of at least one element selected from the group consisting of Ni, Ga, Zr, Nb, Hf, Ta, Mo, Al, Si, V, Cr, Ti and Cu, the balance being a mixture of iron and cobalt and incidental impurities,

hydriding and crushing the mother alloy in an oxygen-free atmosphere of argon, nitrogen or vacuum,

mixing 85 to 99% by weight of the crushed mother alloy with 1 to 15% by weight of the auxiliary alloy, followed by comminution, compacting under a magnetic field, sintering and

aging, thereby yielding a sintered magnet having an oxygen concentration of up to 0.8% by weight, and magnetic properties including a residual flux density Br of 12.0 to 15.2 kG and a coercive force iHc of 9 to 35 kOe,

cutting and/or polishing the magnet to give a finished surface, and

heat treating the magnet in an argon, nitrogen or low-pressure vacuum atmosphere having an oxygen partial pressure of 10^{-6} to 10^{0} torr for 10 minutes to 10 hours <u>at a temperature of 200 to 1,100°C</u>.

Claims 4 and 5 have been abandoned in favor of the following claims:

Claims 6-18.